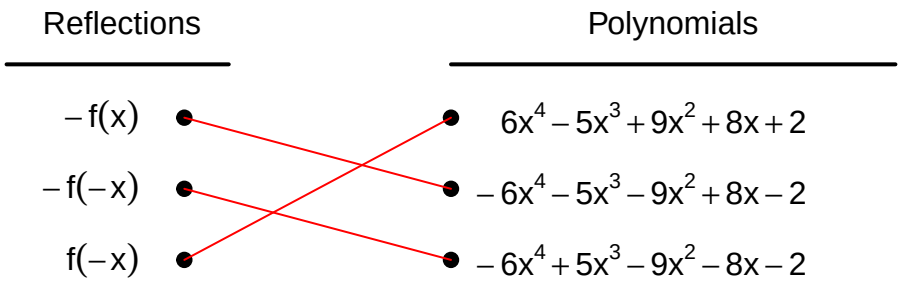
Name: Date:

# Exam: Function Reflections (Solution version 619)

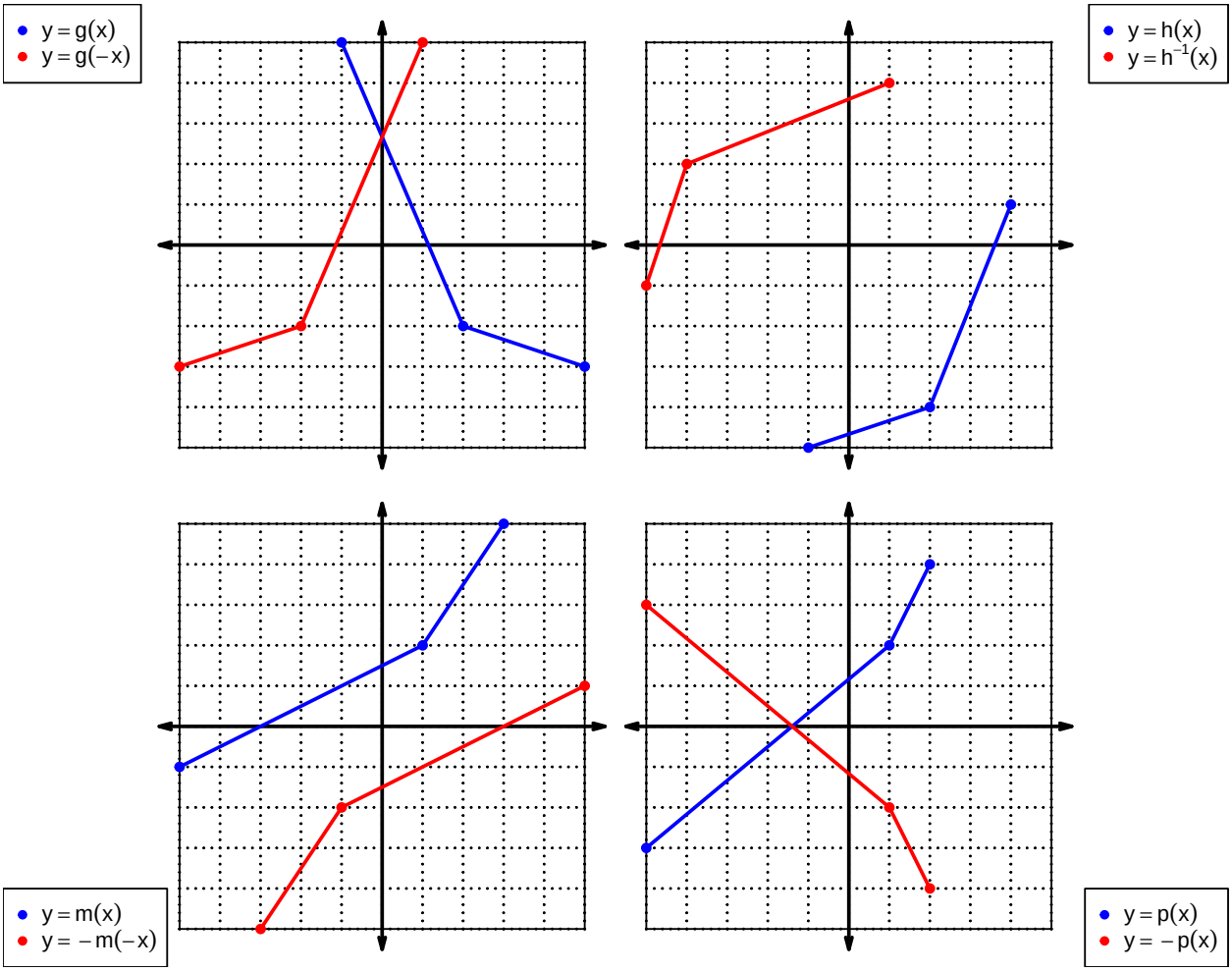
1. (worth 9 points) Let function $f$ be defined by the polynomial below:

$$f(x) = 6x^4 + 5x^3 + 9x^2 - 8x + 2$$

Draw lines that match each function reflection with its polynomial:




2. (worth 20 points) In each $xy$ plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The $x$ axis is horizontal and the $y$ axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions $f$, $g$, and $h$ are defined by the table below.

| $x$ | $f(x)$ | $g(x)$ | $h(x)$ |
|---|---|---|---|
| 1 | 7 | 1 | 4 |
| 2 | 8 | 9 | 9 |
| 3 | 1 | 7 | 5 |
| 4 | 6 | 2 | 3 |
| 5 | 2 | 5 | 6 |
| 6 | 3 | 8 | 1 |
| 7 | 9 | 6 | 2 |
| 8 | 5 | 4 | 7 |
| 9 | 4 | 3 | 8 |

3. (worth 3 points) Evaluate $f(6)$.

$$f(6) = 3$$

4. (worth 3 points) Evaluate $h^{-1}(2)$.

$$h^{-1}(2) = 7$$

5. (worth 3 points) Assuming $g$ is an **odd** function, evaluate $g(-5)$.

If function g is odd, then

$$g(-5) = -5$$

6. (worth 3 points) Assuming $f$ is an **even** function, evaluate $f(-1)$.

If function f is even, then

$$f(-1) = 7$$

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7. (worth 15 points) A function, $f$, is **even** if $f(x) = f(-x)$ for all $x$ in the domain. A function, $g$, is **odd** if $g(x) = -g(-x)$ for all $x$ in the domain.
Let polynomial $p$ be defined with the following equation:

$$p(x) = -x^2 + 1$$

a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) = -(-x)^2 + 1$$
$$p(-x) = -x^2 + 1$$

b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) = -\left(-x^2 + 1\right)$$
$$-p(-x) = x^2 - 1$$

c. Is polynomial $p$ even, odd, or neither?

even

d. Explain how you know the answer to part c.

We see that $p(x) = p(-x)$ for all $x$ because $p(x)$ and $p(-x)$ are equivalent polynomials. Thus function $p$ satisfies the criterion for being an even function.

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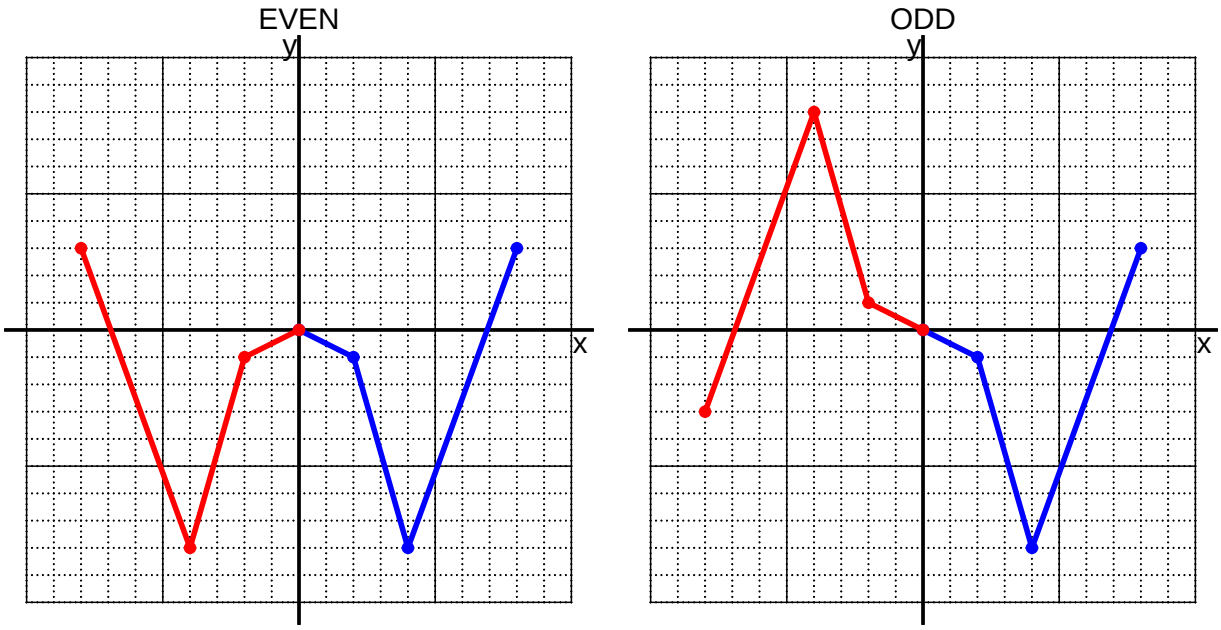
8. (worth 10 points) I have drawn half of a function. Draw the other half to make it even or odd.




9. (worth 10 points) Let function $f$ be defined with the equation below.

$$f(x) = \frac{x}{9} + 4$$

a. Evaluate $f(72)$.

step 1: divide by 9
step 2: add 4

$$f(72) = \frac{(72)}{9} + 4$$
$$f(72) = 12$$

b. Evaluate $f^{-1}(6)$.

step 1: subtract 4
step 2: multiply by 9

$$f^{-1}(x) = 9(x - 4)$$
$$f^{-1}(6) = 9((6) - 4)$$
$$f^{-1}(6) = 18$$

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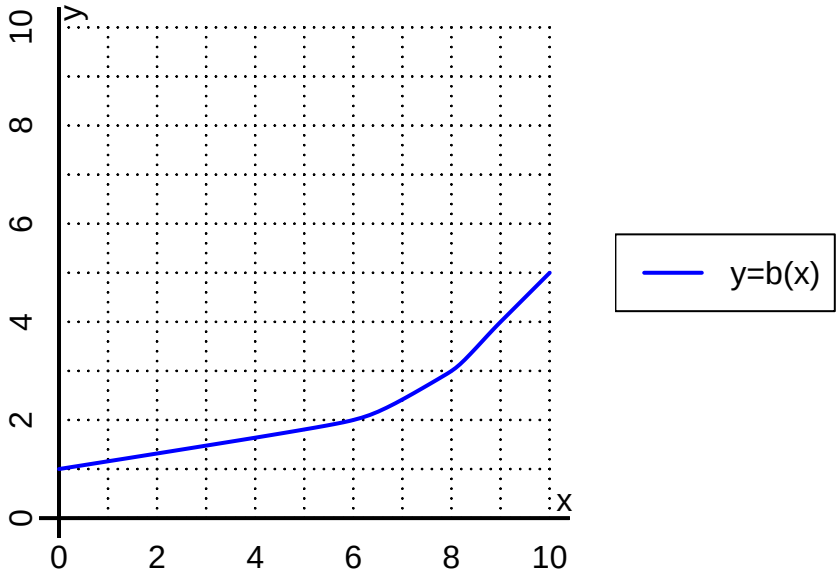
10. (worth 6 points) The function $b$ is represented by the curve $y = b(x)$ graphed below.




a. Evaluate $b(9)$.

$b(9) = 4$

b. Evaluate $b^{-1}(3)$.

$b^{-1}(3) = 8$

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11. (worth 18 points) Function $f$ is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

| $x$ | $f(x)$ | $-f(x)$ | $f(-x)$ | $-f(-x)$ |
|---|---|---|---|---|
| -2 | 6 | -6 | -6 | 6 |
| -1 | 4 | -4 | 4 | -4 |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 4 | -4 | 4 | -4 |
| 2 | -6 | 6 | 6 | -6 |

b. Is function $f$ even, odd, or neither?

neither

c. How do you know the answer to part b?

Function $f$ is neither because neither column $-f(-x)$ nor column $f(-x)$ matches column $f(x)$ exactly.